Cooperative Artefacts and Spatial Representations

Overview and Outlook

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Overview

- Motivation by an application scenario
- Cooperative Artefacts
 - Framework for smart objects
- Spatial algorithm for Cooperative Artefacts
- Future research directions
- Discussion and questions



Cooperative Artefacts¹ (CAs)

- Framework for reasoning with smart objects
- Distributed reasoning without external infrastructure
- Assessment of context based on:
 - domain knowledge
 - observation of the world
 - domain rules
 - sharing of knowledge with other CAs

1: Martin Strohbach et al.. Cooperative Artefacts: Assessing Real World Situations with Embedded Technology. Ubicomp 2004.







Spatially Aware Reasoning

- A container has to identify containers in a certain proximity
- Range queries necessary: inRange(A,B,r)
- Relate US technology has measurement range of around 2-4m
- Longer distances have to be inferred
- · Low-complexity algorithm is important
 - Relative positioning isn't necessary because only distances are needed.





Algorithm (3) - Evaluation

- We used simulation in the design process of the algorithm
 - Analysis of inferred intervals
 - Determining optimal parameters for our range query algorithm
- Simulation was used to evaluate accuracy
 Random networks of 200 nodes
- In small real sensor network we showed the feasibility of our approach

Outlook (1)

- A model of a cooperative artefact
- Multiagent System (Jennings et al.)
 - A multiagent system is a system that has these four properties:
 - each agent has incomplete information, or capabilities for solving the problem, thus each agent has a limited viewpoint;
 - there is no global system control
 - data is decentralised; and
 - computation is asynchronous

Outlook (2)

- Cooperative Artefact framework is a first approach to this idea
 - Sensors
 - Actors
 - Rule-based cooperative reasoning
- We want to look into certain aspects:
 - Coordination distributed decision
 - Communication solving a problem, negotiating with others, exchanging knowledge
 - Common knowledge What do other agents know?
 Do they know what I know? "Social conventions"

Questions and Discussion

- Agent idea in a preliminary stage
 Input, Suggestions ?
- Spatial algorithm paper is under submission
- General questions?